Bremerton Westside Wastewater Treatment Plant

SRF Application Memorandum

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Background and Purpose

The City of Bremerton (City) has identified several significant treatment system components at the Westside Wastewater Treatment Plant (WWTP) that are at the end of their useful life and must be refurbished or replaced. These upgrades have been bundled as part of a single project included in the City's 6-year Capital Improvement Plan (CIP) under the project heading, Westside Wastewater Treatment Plant Upgrade (Project ID WW00087). In order to most efficiently plan, design, and construct these improvements, the City has grouped the individual improvements into a single project that will be included as part of a loan application administered through the Department of Ecology's (Ecology) Clean Water State Revolving Fund (CWSRF or SRF) loan funding program.

The City selected Casey Civil, PLLC to compile available information and produce this SRF Application Memorandum (Memo) to support the funding application. This memo provides feasibility and background information that will be used to develop an engineering report for the individual improvements that are further pursued once funding is secured. The individual improvements include:

- Centrifuge Replacement
- Aeration Basin Supply Piping Replacement
- Boiler System Reliability Improvements
- Grit Chamber Rehabilitation
- Headworks Screen Replacement
- Odor Control Stack Reinstallation

Design criteria for individual improvements were selected to match existing systems or based on flows from the 2014 Wastewater Comprehensive Plan (WWCP), which is currently being updated. Flows from Table 4-8 of the 2014 WWCP are below.

Year	Flow (mgd)				
	Average Day Dry Weather	Average Annual	Max Month (May-Sep)	Max Month (Oct-Apr)	Max Day
Permit Limit	N/A	N/A	11.0	15.5	N/A
2013	4.0	5.2	4.5	10.0	27.0
2018	4.4	5.6	4.9	10.4	27.4
2025	5.1	6.3	5.6	11.1	28.1
2033	6.0	7.2	6.5	12.0	29.0
2033 with new service area	7.4	9.2	8.1	15.4	36.0

Based on information provided by operations staff, an average annual flow of 4.6 mgd and a max day flow of 26.0 mgd were documented in 2022. Additionally, the average annual flow over the past four years (2019 to 2022) has ranged from 4.4 to 5.1 mgd, and the highest reported max day flow was 26.0 mgd in 2022. These reported flows indicate that the current flows are well within the flows projected for the year 2018 in the table above.

The National Fire Protection Agency (NFPA) 820 code is referenced in several sections of this memorandum. This code was established to address areas of a wastewater treatment plant where flammable gas accumulation could occur, presenting a potentially explosive situation. The correlating classification of an area based on NFPA 820 dictates the need for explosion-proof equipment and electrical gear when a hazardous environment exists.

Improvement cost estimates listed in this memorandum are based on the information currently available and generally considered a Class 4 estimate, as defined by the Association for the Advancement of Cost Engineering (AACE). The Class 4 estimate has a project maturity level of 1% to 15%, appropriate for project feasibility development, and correlates to an expected accuracy range of -30% to +50% of the estimated cost. Costs below were developed in July 2023 with an Engineering News Record (ENR) Seattle city cost index of 15174.36. Included in the cost estimates are project contingencies (30%), sales tax (9.2%) and engineering and administrative costs (15% to 25% based on complexity and relative project size).

At this level of project maturity, cost allowances are identified to estimate installation, electrical modifications, and miscellaneous ancillary improvements. However, major equipment and material cost estimates were procured from manufacturers. This information collected for each of the individual improvements is included in the Appendix.

This memo focused on the improvements previously identified. The information presented is based on discussions with operations staff, site visits and review of existing data, including limited record drawings. No testing of any equipment or materials was completed as part of the development of this memo. Development of designs in subsequent phases will require more detailed dimensional information and/or surveys of the existing structures, piping, and electrical/control systems.

1. Centrifuge Replacement

1.1 System Description

In 1995, the City switched from using a dissolved air flotation thickener (DAFT) system to a centrifuge to separate biosolids and liquids following anaerobic digestion. The centrifuge accepts biosolids from the primary and secondary clarifiers after undergoing anaerobic digestion. The dewatered solids are then transported offsite and land applied per the City's Biosolids Management Plan.

The City installed a second centrifuge to improve system reliability in 2008. In 2019, the City attempted to have the original 1995 centrifuge rebuilt, but the wear was too severe. Since that time, the City has relied on a single centrifuge that is operated three-to-four days per week for most of the daytime operation shift (roughly 6 hours). The centrifuge operates at an input rate of roughly 150 gallons per minute (gpm) at approximately 2.5% solids and produces a dried cake at approximately 22% solids.

1.2 Deficiencies

The treatment plant has been down to one operating centrifuge unit since 2019 and during periods of scheduled or emergency repairs, there is no dewatering, which results in higher sludge hauling fees. If the existing centrifuge fails, the City will experience significant cost increases for hauling biosolids at approximately 2.5% solids rather than 22% solids, if land application of the higher water content solids is feasible.

In addition to the centrifuge replacement, it is recommended that the City complete an evaluation to confirm the ventilation system for the centrifuge/solids processing room is ventilated at a minimum of six air changes per hour (ACH) to be considered an unclassified space in accordance with the NFPA Code 820. This evaluation can be incorporated into the Odor Control System Study the City is currently pursuing, discussed later in this memo.

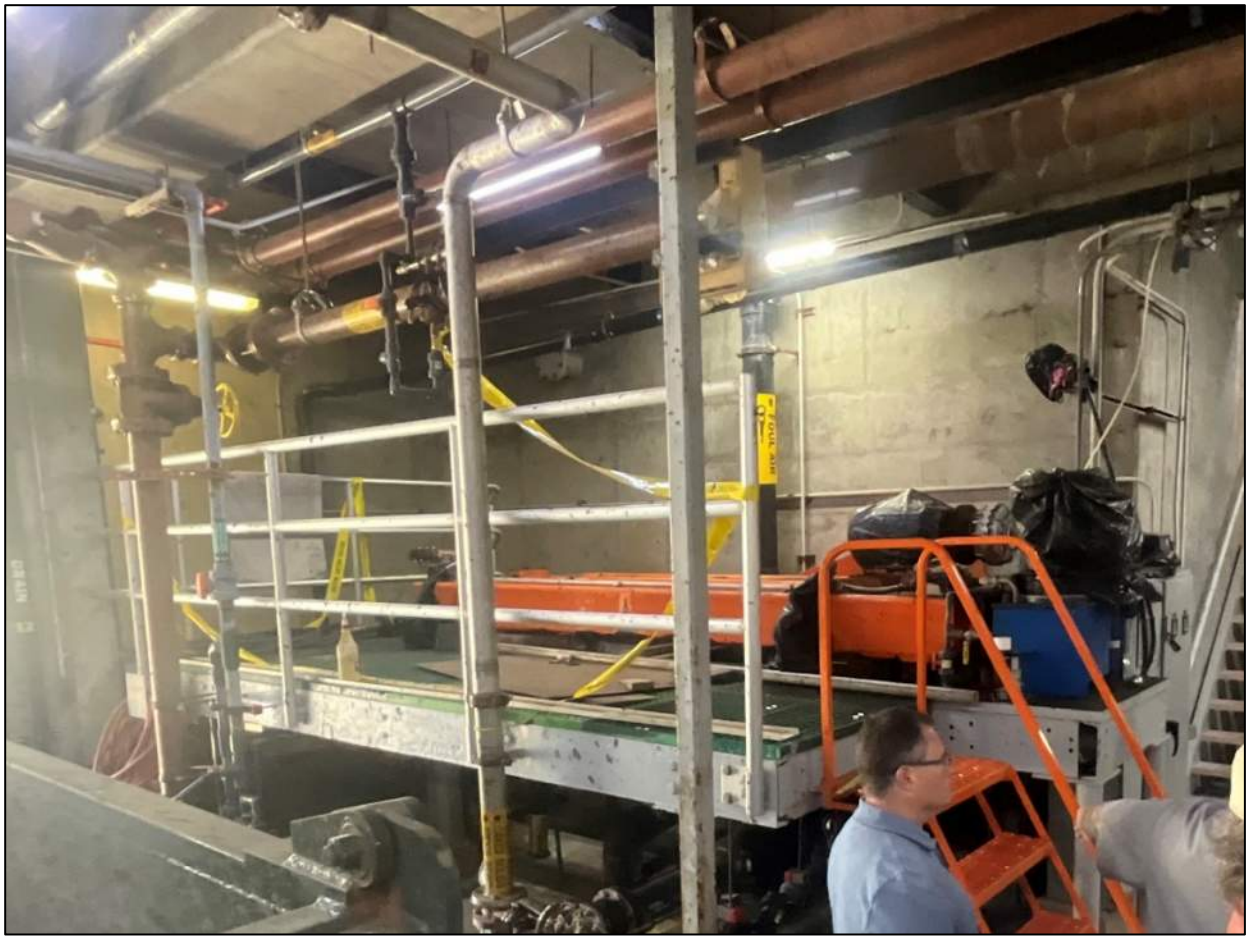

***Figure 1** – The remains of the original centrifuge include the platform, centrifuge base, and piping.*

1.3 Improvement Summary

Installing a second centrifuge unit will allow for additional capacity for future growth as well as redundancy when equipment is offline. For scope and budgeting purposes, the second unit is assumed to match the design criteria of the current centrifuge (manufactured by Centrisys).

Basis of design

- Max Flow – 175 gpm
- Percent (%) solids in – 2.5%
- Percent (%) solids out – 22-23%

The new centrifuge unit will be installed where the original, inoperable centrifuge is located. This will allow use of the majority of the existing feed piping and centrate drain system. See **Figure 2** for a general footprint of the improvement.

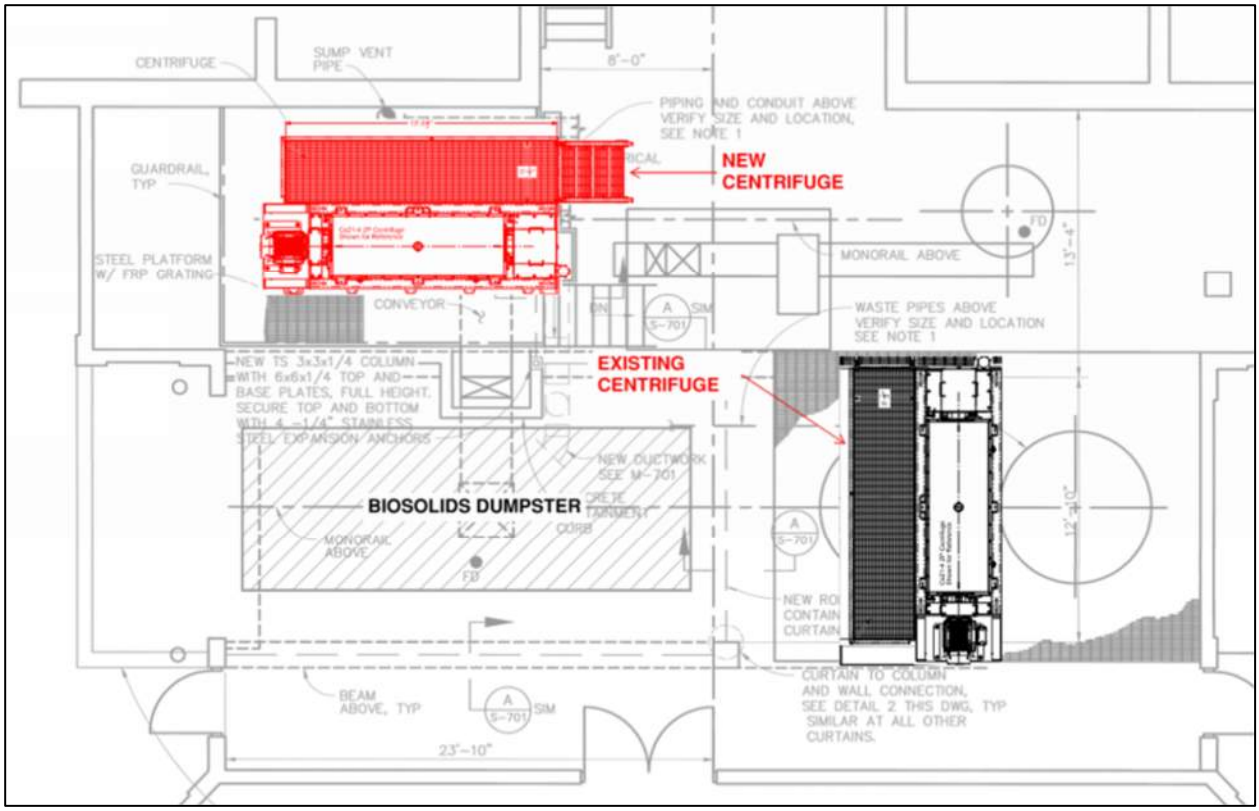

Figure 2 *– Improvement includes new centrifuge, cake pump, and ancillary modifications in place of the original.*

In addition to the new centrifuge unit, a solids cake pump will be included to convey the thickened solids to the dumpster. Allowances are also included to facilitate demolition of existing equipment, electrical and controls installation and integration, minor structural/support modifications, and replacement of approximately 50 feet of the existing 3-inch diameter solids conveyance piping. The improvement cost summary is included in **Table 1**, below.

Table 1: Centrifuge Replacement Improvement Cost

Description	Cost
Mobilization (~8% of Sub-Total)	$70,000
Demolition	$5,000
Centrifuge Equipment	$519,000
Cake Pump Equipment	$88,000
Centrifuge and Cake Pump Installation (25% of equipment costs)	$150,000
Piping Modifications (~50 feet of 6-inch cake piping, valves, miscellaneous)	$10,000
Electrical Allowance (15% of equipment costs)	$91,000
Structural Modifications	$10,000
Sub-Total	$943,000
Contingency (30%)[(1)]	$283,000
Sales Tax (9.2%)[(1)]	$113,000
Engineering Design and Administration (15%)[(1)]	$201,000
Grand Total	**$1,540,000**

[(1)] Value is calculated as a percentage of the cumulative total, including prior percentages.

2. Aeration Basin Supply Piping Replacement

2.1 System Description

The air supply for the two (2) aeration basins is provided via two (2) conveyance pipelines. These lines are 14-inch diameter pipes that supply air from the blower building to each of the aeration basins. The existing air supply lines were installed with the original treatment plant construction in 1985.

2.2 Deficiencies

During rainy periods, air bubbles can be seen bubbling up through gravel and paved areas along the path of the buried air piping, indicating that the existing carbon steel air piping has corroded to the point that it is leaking air and wasting blower energy. The City excavated along the aeration basin wall to the air supply piping and confirmed the pipeline is corroded and leaking.

Figure 3 *– Exposed air supply piping confirmed suspicion of corrosion and leakage.*

2.3 Improvement Summary

This improvement is assumed to replace the existing carbon steel air piping with stainless steel pipe of the same size, each 14-inch diameter. Lining the existing pipes was briefly considered but dismissed due to the expense and risk associated with the depth of the pipeline and the number of bends. All the buried air piping will be replaced between the blower room discharge header and the connection at the gooseneck at each aeration basin. Due to the depth of the existing pipeline and buried utilities in the area, it is anticipated that the routing of the new

piping will be shallow to avoid conflicts. This will result in the pipelines exiting the building above grade before dropping below grade in route to the aeration basins. See **Figure 4** for a general footprint of the improvement.

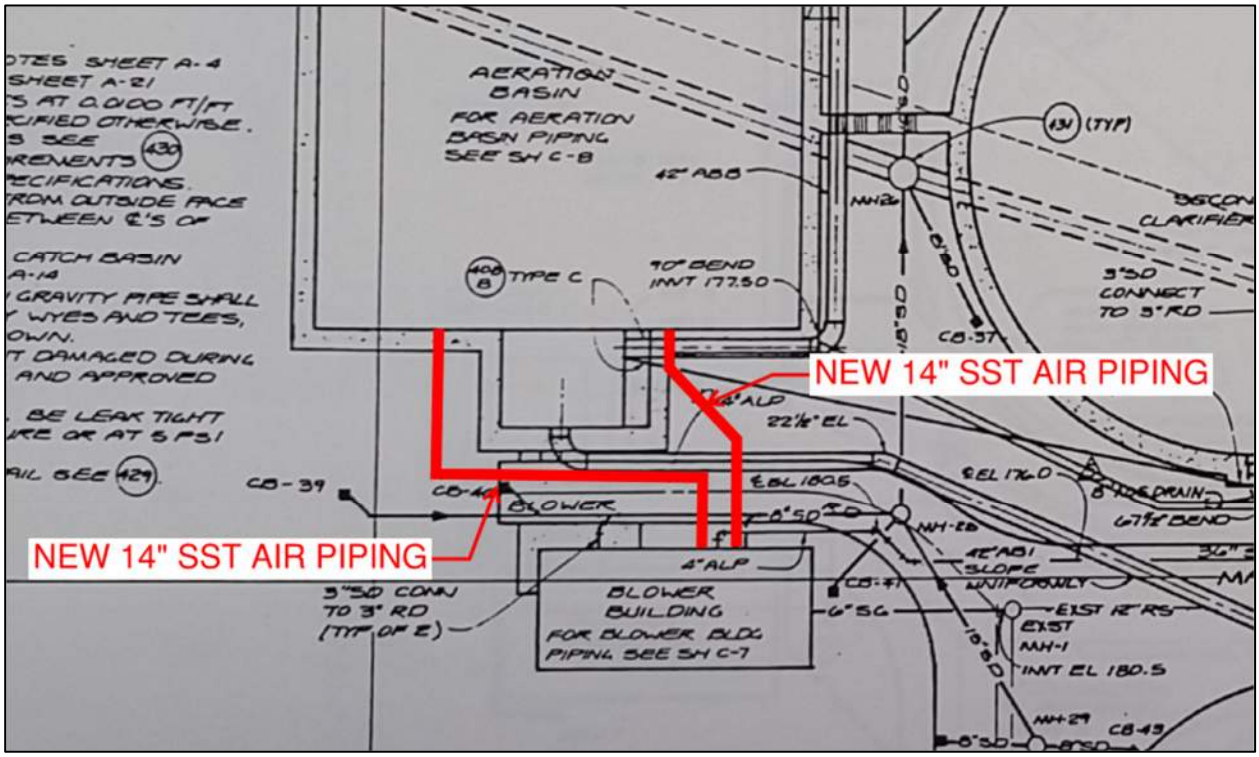

Figure 4 *– New air supply piping will be routed from the header in the blower room to each of the aeration basins.*

In addition to the new piping, allowances are included for minor modifications to the blower building to accommodate new piping, pipe supports where the pipe is not buried, and abandonment of the existing pipes. Abandonment of the existing pipes is assumed to include filling the pipes with a low-strength concrete material to prevent the transport of soils that may enter the corroded pipe. The improvement cost summary is included in **Table 2**, below.

Table 2: Aeration Basin Supply Piping Replacement Improvement Cost

Description	Cost
Mobilization (~8% of Sub-Total)	$11,000
Blower Building Modifications	$20,000
Schedule 10 Stainless Steel 14” Diameter Air Piping (~200 feet at $500 per foot)	$100,000
Pipe Supports (four per pipe at $2,000 each)	$16,000
Abandon Existing Pipes Allowance	$5,000
Sub-Total	$152,000
Contingency (30%)[(1)]	$46,000
Sales Tax (9.2%)[(1)]	$18,000
Engineering Design and Administration (20%)[(1)]	$43,000
Grand Total	**$259,000**

[(1)] Value is calculated as a percentage of the cumulative total, including prior percentages.

3. Boiler System Reliability Improvements

3.1 System Description

The City's westside treatment plant utilizes a 48 boiler-horsepower (approximately 1,607,000 BTU/hr) boiler to provide heat for the digesters. The current boiler, installed in 2009, is a Burnham commercial unit that is plumbed to run on both digester gas methane and natural gas, with the digester gas serving as the primary fuel source. The boiler does not have any scrubbers or filter technology to clean the digester gas prior to the boiler.

City data from January, May, and June 2023 shows that the anaerobic digesters produce an average of around 25-30 standard cubic feet per minute (scfm) of gas, with roughly 13 scfm consumed by the boiler and the rest burned by the waste gas flare. While running consistently, the boiler uses 12-14 scfm and peaks at around 25 scfm when the boiler starts up after being off for a few hours. The City operates the boiler system to maintain a digester temperature of 100 degrees Fahrenheit.

3.2 Deficiencies

Without a gas scrubbing/filter system, contaminants in the digester gas, believed to predominantly be hydrogen sulfide (H_2S), have contributed to significant corrosion of the boiler system components. The City reports that the boiler has been undergoing a stream of constant repairs such as $16,000 for a new valve and $100,000 on replacement tubes and sheets.

When the boiler is shut down for repairs, there is no additional boiler in operation, so the digesters slowly lose heat until a rental boiler is in service, or the repairs are completed. Additionally, the boiler was out of service for a few months in 2020 and the treatment plant used a rental boiler that ran on natural gas, which is an additional expense for the rental and fuel. The need for an additional boiler is documented in the 2014 WWCP, CIP Project T-19, Westside WWTP Boiler Replacement.

Table 6.2.2 of the current NFPA 820 code identifies digester gas processing rooms as requiring a minimum of 12 air changes per hour in order to be reduced from Class 1, Division 1 to Class 1, Division 2, and no level of ventilation can reduce the area to be considered an unclassified space. This means that electrical and control components in the room where the current boiler is located and adjacent areas are likely not compliant with current code requirements.

Figure 5 *– After being rebuilt and replacing valves, the existing boiler is operational, but reliability is still of concern.*

3.3 Improvement Summary

To improve reliability, this improvement will add a second boiler along with a gas scrubbing system to improve the life of the boilers. Given that the boiler system cycles on and off on a daily basis, there is no apparent need to increase the size of the boilers. Design development should confirm gas production and refine the size of the boilers and gas scrubbing system.

The current boiler room and connecting rooms are not likely to comply with the current NFPA 820 code, and code-compliant use of the existing system would require all lighting, electrical, and controls to be replaced with explosion-proof components or relocation of the boiler. Given the condition of the existing boiler, which has significantly reduced its service life and decreased its reliability, plus the additional sequencing logistics required to relocate it, replacement is anticipated to be the most feasible option.

To accommodate a second boiler and comply with the current NFPA 820 code, a separate room will be created in the existing shop space in the digester complex. All access to this room will be from the exterior only, all other accesses will be sealed per code. The City's non-potable water supply system is currently located in this area and will be relocated to the current boiler room. Additions and modifications to the existing gas piping system will need to be made for the new boiler location and the gas treatment system.

Construction sequencing requires that at least one boiler is operational at all times and that the non-potable supply water skid is moved prior to construction of the new boiler room. A possible sequence of construction follows:

1. Relocate non-potable water system to temporary location.
2. Construct new boiler room (existing shop space)
3. Modify gas and hot water piping to accommodate new boiler location.
4. Install new boiler(s).
5. Remove/relocate existing boiler.
6. Relocate non-potable water system to old boiler room.

The following was used as the basis of design, and the general footprint of modifications is shown in **Figure 6**.

- Available digester gas rate: 30 - 40 scfm
- Boiler size: ~50 boiler horsepower, each
- Gas scrubber airflow: ~35 scfm

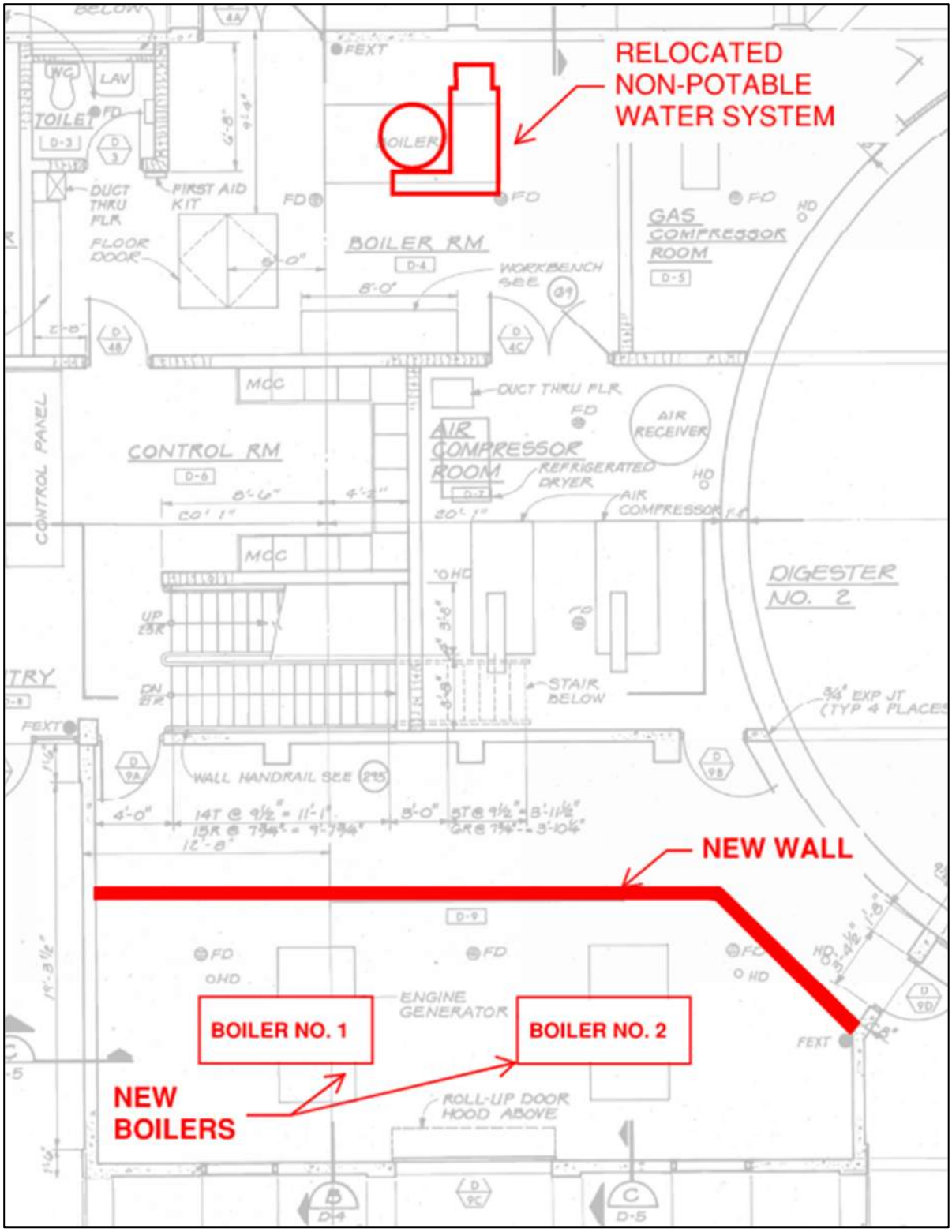

Figure 6 *– A new room will be created to separate the code-classified space for the boilers.*

The improvement cost summary is included in **Table 3**, below.

Table 3: Boiler System Reliability Improvements Improvement Cost

Description	Cost
Mobilization (~8% of Sub-Total)	$110,000
Temporary Relocation of Non-Potable Water System	$10,000
Construction of New Boiler Room (~500 square feet at $200 per square foot)	$100,000
New Boiler Room Ventilation System (~1,000 cfm supply and exhaust fans)	$25,000
New Boilers Equipment (single boiler is $350,000)	$640,000
New Boilers Installation (30% of equipment cost)	$192,000
Gas Scrubber Equipment	$90,000
Gas Scrubber Installation (40% of equipment cost)	$36,000
Existing Boiler Demolition	$10,000
Non-Potable Water System Relocation	$15,000
Piping Modifications (water and gas, ~100 feet of each at $100 per foot)	$20,000
Electrical Allowance (30% of equipment cost)	$227,000
Structural Modifications (sealing wall penetrations, housekeeping pads, etc.)	$10,000
Sub-Total	$1,485,000
Contingency (30%)[(1)]	$446,000
Sales Tax (9.2%)[(1)]	$178,000
Engineering Design and Administration (15%)[(1)]	$316,000
Grand Total	**$2,425,000**

[(1)] Value is calculated as a percentage of the cumulative total, including prior percentages.

4. Grit Chamber Rehabilitation

4.1 System Description

The Westside WWTP employs aerated grit chambers downstream of the screens and upstream of the primary clarifiers. In these chambers the grit settles out and is conveyed to disposal. The grit chambers, constructed in 1995, consist of two concrete basins covered by aluminum decking, operating in parallel. Each basin is approximately 34-feet long by 10-feet wide and 17-feet deep, with a hopper-style bottom, and flow from the two basins combines in a common effluent box.

The covered basins have a suction air duct that is part of the in-plant odor control system. No air intake is provided for the basins, although the design may have planned for the aeration system to provide the air supply.

4.2 Deficiencies

The hydrogen sulfide gases from the wastewater have contributed to corrosion of the concrete structure, as well as the aluminum covers, primarily at the downstream end of the structure. The City had to replace the covers at the downstream end of the grit chamber after they failed due to corrosion.

The City continues to measure high concentrations of hydrogen sulfide gas, both inside the grit chamber and at joints in the aluminum decking where gas can escape. City staff have sealed up the small openings with sealant to keep the H_2S gas contained within the grit chambers and treated through the plants odor control system. However, the existing odor control system and/or the balancing of that system, does not appear to be sufficient to draw the foul air from the grit chambers. The City is currently

pursuing and Odor Control System Study that will assess and attempt to balance the existing system study, which will determine proper air flow rates from the grit chamber as well as other processes throughout the plant.

***Figure 7** – The corrosive atmosphere in the grit chambers has deteriorated concrete and the aluminum covers.*

4.3 Improvement Summary

The grit chamber was not opened for inspection, but City staff report that deterioration is only visible in the top five feet of the structure plus the upper 10 feet of the common effluent box, which will serve as the limits of the coating system along with the underside of the covers. The scope of improvements will include sand blasting of each of the basins, temporary removal of some of the grit conveyor and aeration piping, bypass pumping around the effluent box, and coating approximately 2,500 square feet of the structure and lid. The coating system is tentatively planned to be a high solids epoxy, such as Raven 405, a common coating system for wastewater infrastructure in the region. The extent of the coating is shown in **Figure 13**.

Concrete spot repairs are anticipated to require cleanup of the spalled area following sandblasting and rebuilding with concrete or grout prior to coating. No replacement of steel reinforcement is accounted for in this estimation. In the next phase of design one of the chambers should be drained, cleaned and inspected to quantify the extent of repairs needed. The improvement cost summary is included in **Table 6**, below.

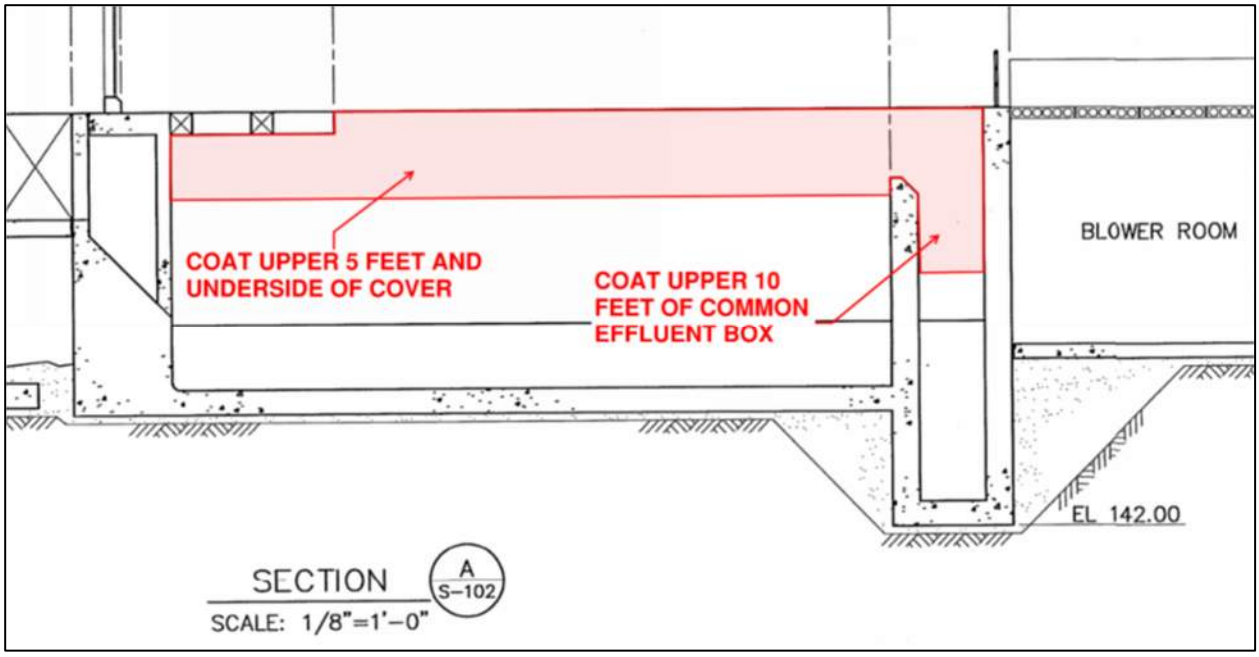

Figure 8 *– The upper portion of the grit chambers, the effluent box, and the underside of the covers will be cleaned and coated.*

Table 6: Grit Chamber Rehabilitation Improvement Cost

Description	Cost
Mobilization (~8% of Sub-Total)	$16,000
Removal and Reinstallation of Grit System Belt and Aeration Diffusers	$15,000
Bypass Pumping for Effluent Chamber Prep and Coating	$15,000
Ventilation, Safety, Scaffolding Allowance	$10,000
Sandblasting	$10,000
Concrete Repair (500 square feet at allowance of $100 per square foot)	$50,000
Interior Coating System (~2,500 square feet at $40 per square foot)	$100,000
Sub-Total	$216,000
Contingency (30%)[(1)]	$65,000
Sales Tax (9.2%)[(1)]	$26,000
Engineering Design and Administration (15%)[(1)]	$46,000
Grand Total	**$353,000**

[(1)] Value is calculated as a percentage of the cumulative total, including prior percentages.

5. Headworks Screen Replacement

5.1 System Description

The influent wastewater at the City's Westside WWTP first enters the headworks building and flows through mechanical screens to filter out large solid objects, debris, and other inert material that is not compatible with the treatment process. Two (2) screens are in use constantly with a third screen that can be manually turned on during high flows. The screenings are then transferred to disposal via a conveyer system with auger.

The mechanical screen equipment is manufactured by Parkson and has been in use since 1995. The two screens that are in constant service are each set in a three-foot wide, six-foot deep concrete channel. The third, high flow, screen is located in between the two other screens in a four-foot wide, six-foot deep concrete channel. All screens are in alignment and deposit screenings directly into the conveyor system.

5.2 Deficiencies

The screens are reaching the end of their service life, showing signs of significant wear and corrosion. The screen sizing is wearing down, creating larger openings for materials to get through, which is impacting downstream processes. The conveyer system is also undersized as material reportedly spills out of the device during wet season peak flows. The need to address the condition of the screens is documented in the 2014 WWCP, CIP Project T-17, Influent Fine Screen 1 and 2 Upgrade.

The reason for the screenings conveyance system becoming overwhelmed during higher flows should be reviewed and addressed. Additionally, the screenings have a considerable liquid content as they are dropped into the dumpster below. This high liquid content has led to challenges with the waste hauling company and the City would like to implement a washer/compactor unit that would reduce the potential for future issues.

Figure 9 *– The original 5/8-inch screens require replacement to improve screening capture and quality of captured screenings.*

5.3 Improvement Summary

This improvement will consist of replacing the two three-foot-wide screens with finer screens, reducing from 15 mm openings to 6 mm openings, which the manufacturer has reviewed to confirm sufficient hydraulic capacity based on the design criteria from the 1995 screen installation and flows projected in the 2014 WWCP. The new screens will be stainless steel to prevent corrosion and will include wash systems to reduce the amount of organic materials being removed with the screenings and support the cleaning of the screens. The four-foot-wide screen will remain unmodified.

A washer/compactor system is included in this scope of work to improve the condition of the screenings being hauled away. This unit will likely be located on the lower level where the City has approximately eight dumpsters staged. The washer/compacter system should reduce the number of dumpsters the City needs to keep on hand. Due to continued odor issues, the City is interested in the optional screenings bagging system.

With the new equipment and given that the existing screenings conveyance system reportedly has problems during high flow, the conveyance system will be replaced and a second one is likely needed to lift the washed and compacted screenings up into the dumpster.

New motor starters for all new equipment will be installed in the existing electrical room. Additionally, manufacturer-provided control panels will be located in the same room. The general scope of the screen replacements is shown in **Figure 15**, and the improvement cost summary is included in **Table 7**, below.

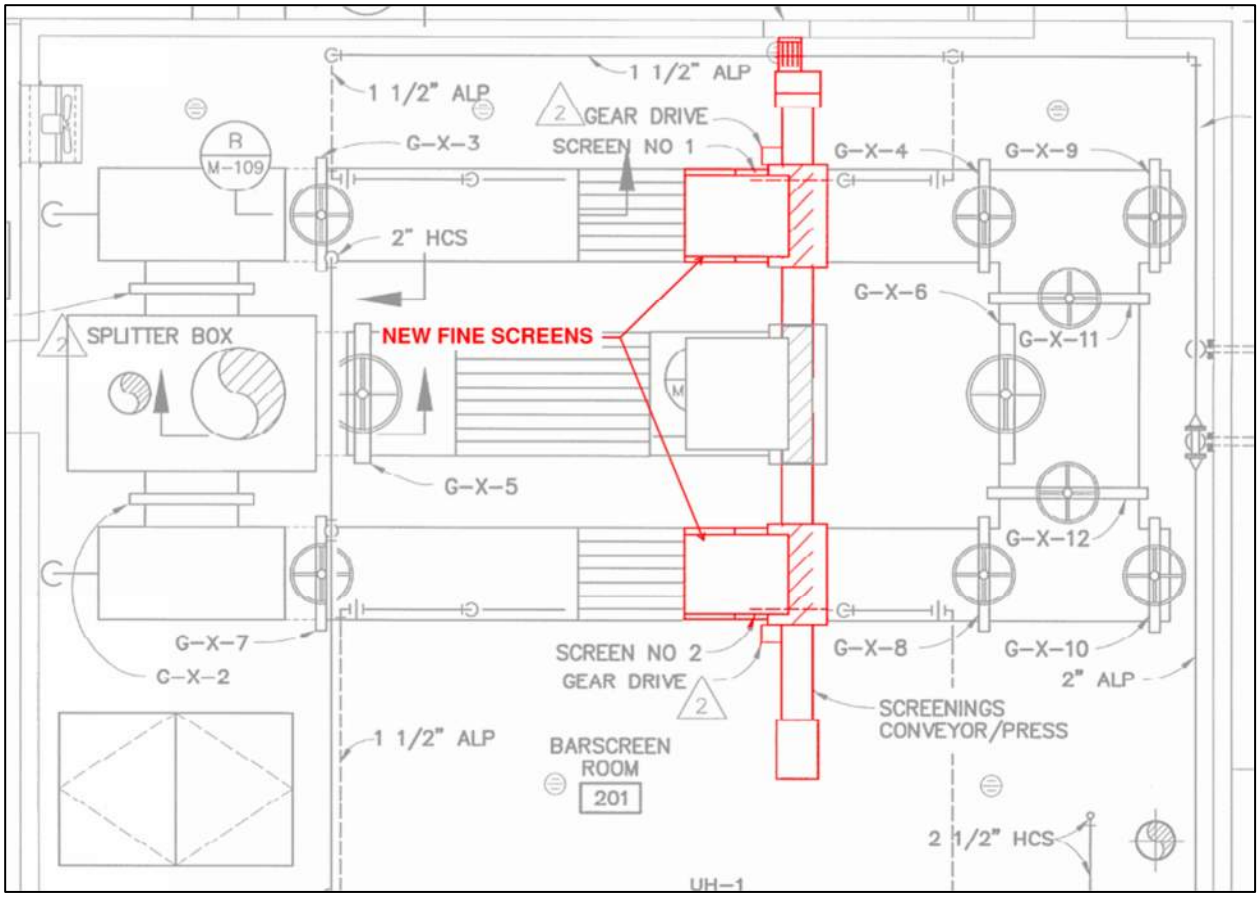

Figure 10 *– The two smaller screens will be replaced, and a washer/compacter will be added along with conveyance systems.*

Table 7: Headworks Screen Replacement Improvement Cost

Description	Cost
Mobilization (~8% of Sub-Total)	$81,000
Demolition	$10,000
Screen Equipment (two screens)	$390,000
Screen Equipment Installation (40% of equipment cost)	$156,000
Screen Motor Starters and Control Panel	$40,000
Screenings Washer/Compactor Equipment	$90,000
Screenings Washer/Compactor Installation (40% of equipment cost)	$36,000
Washer/Compactor Electrical Starter and Control Panel	$30,000
Screenings Conveyance Equipment	$80,000
Electrical Allowance (25% of equipment cost)	$156,000
Structural Allowance	$20,000
Sub-Total	$1,089,000
Contingency (30%)[(1)]	$327,000
Sales Tax (9.2%)[(1)]	$130,000
Engineering Design and Administration (15%)[(1)]	$232,000
Grand Total	**$1,778,000**

[(1)] Value is calculated as a percentage of the cumulative total, including prior percentages.

6. Odor Control Stack Reinstallation

6.1 System Description

The current location of the discharge for the WWTP odor control system is on top of the Headworks Scrubber building, which is approximately 15 feet above ground level. This discharge is the exhaust end of two blowers mounted on the roof, that is part of the WWTP two stage odor control treatment system. A 40-foot-tall discharge stack was constructed in 1995 as part of the City's odor control project but it was removed in 2011 when the exhaust blowers were replaced. The new centrifugal exhaust fans each discharge vertically to the atmosphere.

6.2 Deficiencies

The City has reported noticeable odors near the plant at times, and there is belief that reinstalling the discharge stacks will solve the problem by discharging the treated air at a higher elevation and facilitating dilution of any residual odors. Odors were not noticed during visits to the WWTP by the Casey Civil team.

In reviewing the air operating permit issued by the Puget Sound Air Pollution Control Agency (PSAPCA), it was noted that the permit was issued associated with the 1995 WWTP Odor Control Project, which included the discharge stack. The modifications made in 2011 that replaced the exhaust fans and eliminated the stack did not modify the permit. While the PSAPCA is likely more interested in the treatment systems in use, which have not changed, they may expect the discharge stack to be reinstalled to comply with the permitted design.

Figure 11 *– When the original exhaust fans were replaced, the discharge stack was not reinstalled.*

6.3 Improvement Summary

City staff initiated contact with ECS Environmental Solutions in 2021 to understand the cost of installing a single, 48-inch diameter, free-standing exhaust stack that would connect to the existing fans. The cost for this equipment was set at $137,255 without installation. This estimate is used in the cost below but is escalated based on the ENR value of 13466.93 for August 2021 to the value of 15174.36 for July 2023, for the City of Seattle, an increase of 12.6% for a new materials cost of roughly $155,000. The new odor control scrubber discharge stack will be located on the same concrete pad the original stack was constructed on, and the current discharge point will be tied to the new stack. The scope of this improvement is generally shown in **Figure 17**, and the improvement cost summary is included in **Table 8**, below.

The City is currently pursuing an Odor Control System Study to assess and balance the existing odorous air collection and treatment system. The outcome of this study will confirm the scope of odor control stack improvement.

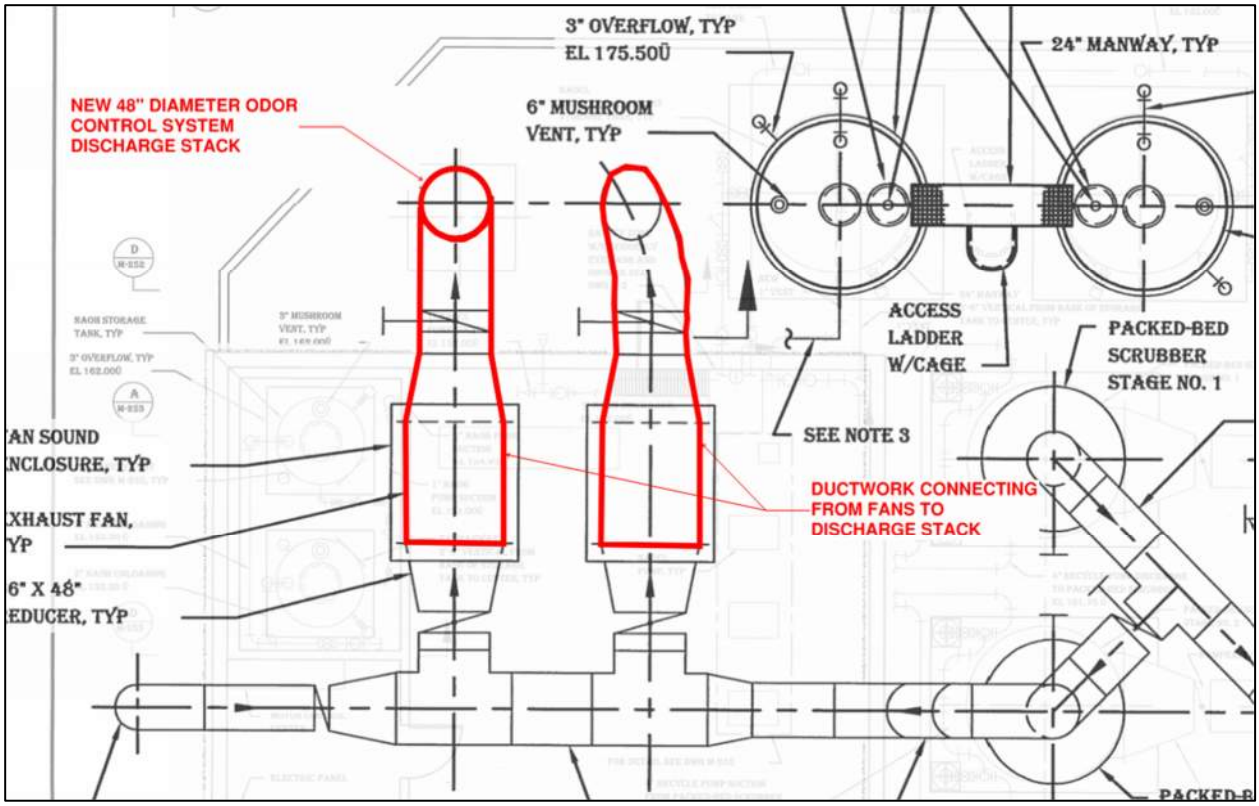

Figure 12 *– The tentative improvement will reinstall the discharge stack and connect to the existing fans.*

Table 8: Odor Control Stack Reinstallation Improvement Cost

Description	Cost
Mobilization (~8% of Sub-Total)	$17,000
Discharge Stack Materials Cost	$155,000
Discharge Stack Installation Cost (estimated at 40% of materials)	$62,000
Sub-Total	$234,000
Contingency (30%)[(1)]	$70,000
Sales Tax (9.2%)[(1)]	$28,000
Engineering Design and Administration (15%)[(1)]	$50,000
Grand Total	**$382,000**

[(1)] Value is calculated as a percentage of the cumulative total, including prior percentages.

7. Summary of Improvements

Below is a summary of the improvements previously discussed in this memorandum. These costs all represent a Class 4 estimate, as mentioned at the beginning of this memorandum. This level of estimate represents a project maturity of 1 to 15 percent and an expected accuracy range between -30% and +50% of the estimated cost.

Name	Description	Improvement Cost
Centrifuge Replacement	Replace old centrifuge and cake pump to match existing duty centrifuge and cake pump system.	$1,540,000
AB Air Supply Line Replacement	Replace leaking air supply lines with stainless steel pipe, matching existing pipe diameter.	$259,000
Boiler Replacement	Install two new boilers in a new constructed room with a gas scrubbing system and relocate the non-potable water system.	$2,425,000
Grit Chamber Rehabilitation	Repair and coat existing grit chamber structure.	$353,000
HW Screen Replacement	Replace two primary screens with finer screens and replace screenings conveyance system.	$1,778,000
Odor Stack Replacement	Install odor control system exhaust stack.	$382,000
	Total of Improvement Costs	**$6,737,000**

7.1 Additional Recommendation

In addition to the projects discussed above, questions associated with the odor control system were raised on three of the six projects: the Centrifuge Replacement, Grit Chamber Rehabilitation and Odor Stack Replacement. Ventilation systems are designed and balanced to perform as intended when they are initially commissioned, but over time, minor modifications are made that imbalance the airflow, such as doors/hatches being left open, balancing dampers adjusted, degraded fan performance, changes in the treatment plant processes, etc.

To better understand the flow rates that are needed to draw sufficient odorous air from the various treatment components, the City is currently pursuing an Odor Control System Study that investigates typical H_2S gas levels at the treatment components, evaluates required ventilation rates, and then attempts to balance the airflow across the treatment components before making improvement recommendations. This study has the additional benefit of reviewing the airflow rate and H_2S gas concentrations that need to be processed by the odor control tower system, which may aid in understanding potential releases of noticeable odors and what can be done to address them.

APPENDIX

Equipment Information

and Budgetary Quotes

CENTRIFUGE REPLACEMENT

NUMBER: 10903 REV 4

DATE: 7/25/23

TO: Kevin Golnik
WWTP Maintenance Supervisor
City of Bremerton WWTP
1600 Oyster Bay South
Bremerton WA 98312
(360) 340-2654

REF.: Dewatering Centrifuge

Budget Proposal
City of Bremerton, WA
CS21-4 2PH

Centrisys Contact
Jerod Swanson
Regional Sales Manager
9586 58th place
Kenosha, WI 53144
Ph: (262) 654-6006
Direct: (612) 401-2006
Email: Jerod.swanson@centrisys.us

Centrisys Representative
Chris McCalib
Treatment Equipment Company
249 Main Ave S, Ste 107 #322
North Bend, WA 98045
Ph: (206) 909-1546
Email: chris@tec-nw.com

Centrisys is pleased to provide this budget quotation for the following:

ITEM 1. ONE (1) DECANTER CENTRIFUGE UNIT, MODEL CS21-4 2PH COMPLETE WITH AUTOMATIC HYDRAULIC BACKDRIVE

1.A Basis of Design – Sludge Feed Characteristics

Industry Type:	Municipal Wastewater
Number of units:	One (1)
Design Feed Flow rate/Unit:	TBD
Max Hydraulic throughput/Unit:	175 gpm
Feed Concentration:	TBD

1.B Centrifuge specification

Model:	CS21-4 2PH
Inside bowl diameter (in):	21
Bowl length (in):	94
Bowl length to diameter ratio:	4.3:1
Beach angle (deg):	15
Maximum Bowl speed (RPM):	3150
Type of lubrication:	Grease
Main Motor HP:	60
Back Drive Motor HP:	15
Weight:	10,700 lbs.

1.C Scope of supply

1. Each unit will be provided based on the attached drawing CS21-4 2P Centrifuge GA.pdf
   - (i) Centrifugally Casted Duplex SS Solid bowl
   - (ii) Scroll conveyor with Duplex SS Scroll shaft; 316SS flights
   - (iii) 316SS lower and upper casing
   - (iv) Solid and liquid flexible connectors
   - (v) Dewatered Sludge and Centrate Chutes/Hoppers
   - (vi) Powder coated carbon steel base/frame
   - (vii) Vibration isolators
   - (viii) Spare parts/tools
   - (ix) Control Panel (water cooled)
     - A. 304SS NEMA 4X Enclosure for each centrifuge
     - B. Main circuit breaker
     - C. VFD for main drive motor
     - D. Allen Bradley PLC (compact logix), valve amplifier and motor starter for automatic hydraulic back drive system
     - E. Ethernet communication and historical trending of key parameters
     - F. 10” Allen-Bradley panel view touch screen
   - (x) Instrumentation
     - A. One (1) vibration sensor per unit
     - B. One (1) main bearing temperature sensor, type PT100 on each bearing

9586 58th Place | Kenosha, WI 53144 USA | +1 (262) 654-6006 | info@centrisys-cnp.com | centrisys-cnp.com
CNP - a subsidiary of Centrifuge Systems, LLC | ISO 9001:2015

C. One (1) each Bowl/Scroll speed sensor/unit
D. One (1) Hydraulic oil level/temp, hydraulic pressure sensor/unit

(xi) One (1) Liquid emulsion polymer system
(xii) Automatic Grease Lubrication System
A. One (1) low grease level sensor per unit
(xiii) One (1) trip and 5 days or 40 hours (whichever occurs first) of startup assistance
(xiv) One (1) 4 ft stand, walkway & ladder

BUDGET PRICE:

All of the above for ..... $**518,900** USD
F.O.B. Job Site, freight included, taxes excluded.
Replacement Seepex Cake Pump ..... $ **87,900** USD
TAX ADDER ..... $ **48,000** USD
Tax is estimated and may not reflect the final taxable amount

PAYMENT TERMS:

30% with order; 60% upon shipment; 10% after startup not to exceed 90 days after shipment.

Lead Time: 40-50 weeks following receipt of the Approval drawings

BUYER/OWNER RESPONSIBILITY:

- Feed pump
- Flow meter
- Cake conveyor
- Anchor bolts.
- Building and building plans (Centrisys provides only the layout drawings without any responsibility of updating any plans or building)
- Building modifications
- Structural and Civil engineering labor
- Lubricants
- All utilities that are required for operation
- Unloading, uncrating, installation, and installation supervision. Installation will, at minimum, require a forklift and possibly a crane/hoist.
- Readiness of the Equipment before requesting start-up service. Non-readiness may incur additional charges.
- Compatibility of Equipment materials of construction with process environment.
- Piping connections, platforms, gratings, and railings unless stated otherwise.
- Any other auxiliary equipment or service not detailed above.

Issued by

Matt Marhefke
Applications Engineer

Date: 7/25/23

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AERATION BASIN SUPPLY PIPING REPLACEMENT

H.D. FOWLER COMPANY

Customer: BIDDING CONTRACTORS
Estimator: Luke Watkins
Job Name: 14"STAINLESS STEEL PIPE
Location: KITSAP COUNTY

Estimate: E520606
Bid Date: 6/30/2023

Line	Qty	UoM	Description	Unit Price	Extended Price
1	160	EA	14"X 20' SCH 10 STAINLESS STEEL PIPE	177.86	28,457.60
			Approximate Total		**28,457.60**

BOILER SYSTEM RELIABILITY IMPROVEMENTS

Typical Scope of Supply & Budget

Model DH1722 Low Pressure Columbia Boiler with:

• (1) Boiler	1,722,000 Btu/hr (output)
• (1) Burner	Digester gas & natural gas
• (1) Water Pump	Centrifugal pump
• (1) Boiler Flue (loose)	Schebler or equal
• (1) Expansion Tank	sized for 10% of system water volume

- Boiler:
  - 30 psi design pressure.
  - 460/3/60 electrical.
  - Including operating controls mounted and wired to the boiler on the opposite side as the gas trains.
  - The burner will be mounted and wired to the boiler.
  - Front and rear access door.
  - Locking quadrant dampener.
  - Stack thermometer.
  - Low water cut off.
  - Pressure gauge.
  - 2” insulation.
  - Honeywell controller: firing rate control, limit control, low fie hold control, and operating control.
  - UL CSD-1 code compliant, designed for section 4 of ASME boiler code.
  - Factory test fired on natural gas only.

- Burner: Access Combustion
  - Dual Fuel – Natural gas / digester gas
  - Emissions: Sub 20 ppm NOx on NG
  - Accessories: Piloted Ignition System with Pilot Gas Train
  - Ignition Transformer
  - NEMA 12 Control Panel
  - Siemens Gas Trains
  - Code compliant: UL & CSD-1. (Note: burner will not be UL listed as it has not been tested by UL on digester gas, however all parts will be UL approved.)
  - A low fire hold switch and control.

- There will be an automatic fuel change over system to switch from digester gas to natural gas when the digester pressure is not sufficient and switch back to natural gas when sufficient pressure is built up on the digester gas. These settings are field adjustable.
- Honeywell flame safeguard.
- Seal tight conduit between controls and burner.
- Control panel, Nema 4X:
- Temperature sensor, temperature transmitter, 3-way water blending valve.
- (1) pump mounted on separate base plate with coupling guard and suction diffuser.
- Motor is 7½ HP, 1750 RPM, TEFC, premium eff. With space heater.
- 4" suction, 3' discharge.
- Pump is cast iron with mechanical seal.

- Boiler Flue: Schebler or equal.
  - (1) flue system matched for the boiler offered.
  - Field measurements will be required before releasing the material for fabrication lead time for production after release is 2 weeks plus shipping time.

- Expansion Tank and Trim: Bell & Gossett
  - (1) steel expansion tank will be furnished and shipped loose for field installation by others. Trim items supplied are: ¾" fill valve, 3" water control valve, back pressure valve and pressure reducing valve.
  - Airtrol fitting and gauge glass set.
  - Piping from the boiler to the expansion tank is not by OTI.

- Centrifugal Pump: Bell & Gossett
  - 250 gpm at 60' head.
  - 240/460/3/60.
  - IS pump 4X control panel.

Paint: Manufacturer's standard paint and finish is included.

Items Not Included (unless specifically included in the scope above):

- Sludge pumps, fittings, valves, controls, instruments, etc.
- Pressure indicators, diaphragm seal gauges, temperature gauges, thermometers, transmitters, etc.
- Heat exchangers.
- Connecting water or sludge piping, pipe supports fittings, valves, etc.
- Blind flanges or gaskets unless part of the scope above.
- Isolation valves, expansion/ reducing joints, thermostatic control valves, etc.
- Insulation blankets, or other insulation or weatherproofing materials.
- Field touch up painting, field treatments for piping scratches or scraps, etc.
- Shims, spacers, grout, leveling items, etc.
- Field installation or testing.
- Performance bonds, supply bonds, etc.
- Unloading, weather protection, or storage.
- gas pressure booster pump.
- field wiring, conduit, junc. boxes, RDT units, remote control panels, etc.
- connecting water, sludge, or gas piping (other than the gas trains mounted on the boiler); supports fittings; valves, etc.
- drain or vent valves for boiler front drain connection.
- demolition of existing equipment.
- spare parts.
- conduit, wiring, fittings, connections, junction boxes, etc.
- purge tanks.

Estimated Budget Price:

(2) DH1722 Low Pressure Boilers	$640,000
(1) DH1722 Low Pressure Boilers	$350,000

BUDGET PROPOSAL
HYDROGEN SULFIDE REMOVAL VESSEL

Date: 7/21/2023
Expires: Budgetary

Mike McKamey
Beaver Equipment

Proposal Number: PX-323-3949.1
Project Name: Bremerton WA WWTP

Unison Solutions, Inc. is pleased to provide this **BUDGET** proposal for a H_2S Removal Vessel for the Bremerton WA WWTP Project. This **BUDGET** proposal includes all the CAD design services, technician labor, fabrication, and materials to construct a H_2S Removal Vessel.

Thank you for giving Unison Solutions the opportunity to provide you with the enclosed proposal. If you have questions or require additional information, please contact me at your convenience.

Sincerely,

Adam Klaas
Unison Solutions, Inc.
Phone: (563)-227-4150
Cell: (563)-542-3081
adam.klaas@unisonsolutions.com

UNISON SOLUTIONS, INC. CERTIFICATIONS

- ASME Certification Number (U-Stamp) - 37,381
- ASME Certification Number (R-Stamp) - R7415
- UL Certification Number - 20110405-E255550

EQUIPMENT/SUB-SYSTEMS

HYDROGEN SULFIDE REMOVAL SYSTEM

- Hydrogen Sulfide Removal Media Vessels
- Work Platform and Ladder
- Initial Charge of H_2S Removal Media

DESIGN CONDITIONS

SITE INFORMATION

- Minimum Ambient Temperature	7°F
- Maximum Ambient Temperature	101°F
- Site Elevation	1’ AMSL

SYSTEM REQUIREMENTS

- Gas Flow	25 scfm

INLET GAS CONDITIONS

- Inlet Gas Pressure	10”WC
- Inlet Gas Temperature	100°F
- Relative Humidity	100%
- Methane (CH_4)	61.4%
- Carbon Dioxide (CO_2)	38.4%
- Nitrogen (N_2)	0%
- Oxygen (O_2)	0.3%
- Hydrogen Sulfide (H_2S)	50 ppmv

DISCHARGE GAS CONDITIONS

- Discharge Gas Pressure	5”WC
- Discharge Gas Temperature	100°F
- Dew Point Temperature	100°F
- Maximum Hydrogen Sulfide	<4 ppmv

SITE REQUIREMENTS

ELECTRICAL CLASSIFICATION

- NEC Class I, Division 1 Group D Areas
  - Hydrogen Sulfide Removal System

EQUIPMENT MOUNTING

- Standalone
  - Hydrogen Sulfide Removal System

EQUIPMENT/SUB-SYSTEM DETAILS

HYDROGEN SULFIDE REMOVAL SYSTEM

- (1) Hydrogen Sulfide Removal Media Vessel
  - 4’Ø x 8’ straight side
    -4.6’ of media bed depth
  - Rated for 5psig pressure and 1psig vacuum
  - Materials of construction shall be 304L stainless steel
  - 150# ANSI B16.5 side inlet and outlet connections
  - Flanged and dished top and bottom heads
  - Vessel shall be free-standing on four 304L stainless steel legs
  - Vessel equipped with an 18” top manway
  - Vessel equipped with an 18” side manway
  - Internal supports and grating for media
  - Pressure/Vacuum relief valves included
  - Two top vents with stainless steel ball valves
  - Bottom manual condensate drain with stainless steel ball valves
- Work Platform and Ladder
  - Work platform shall be welded carbon steel construction with satin black powder coat finish
  - Ladder shall be aluminum construction

- Initial Charge of Media

    - The initial charge of media for each Hydrogen Sulfide Removal Media Vessel will be provided.
    - Media to be loaded into Hydrogen Sulfide Removal Vessel by INSTALLATION CONTRACTOR
    - Initial charge of media consists of 1, 2,200-pound super sacks of media per vessel for a total of 2,200 pounds of media

INSTRUMENTATION

- All instrumentation provided will be designed for gas service and rated for use in a NEC Class I, Division 1 Group D area.
- Hydrogen Sulfide Removal System Instrumentation
    - Bi-metal Thermometer
    - Pressure Indicator

PIPING

- Pipe will be SA-312 TP304/304L Weld Pipe, minimum Schedule 10S. Threaded pipe shall be minimum Schedule 40S.
- Flange connections will be ANSI B16.5, SA-182 F304/304L Class 150.
- Pipe welding will follow ASME B31.3 Process Piping. Welded pipe will be visually inspected and pressure tested.
- Gaskets will be 1/16” nitrile bound non-asbestos ring gaskets.

VALVES

- Ball Valves
    - Stainless steel with PTFE or RTFE seat.
    - Valves will be full port.

FASTENERS

- Fasteners shall be ASTM F593 304 Stainless Steel

SUBMITTALS

- Quantity: (1) electronic copy
- Shop Drawings and Product Data will be provided in sufficient detail to confirm compliance with the requirements for the project. Shop Drawings and Product Data will be provided in a complete submittal package.
- Shop Drawings
    - Installation drawings and specifically prepared technical data, including design capacities will be provided.
    - Specifically prepared wiring diagrams unless standard wiring diagrams are submitted with product data will be provided.
    - Written description of operation will be provided.
- Product Data
    - Catalog cuts and product specifications for each product specified will be provided.
    - Standard wiring diagrams unless wiring diagrams are specifically prepared and submitted with Shop Drawings will be provided.

FACTORY TESTING

- Media removal vessels will be hydrotested prior to shipment and will not be included in the Factory Testing.
- The CUSTOMER can witness the testing and Unison will inform the customer (2) weeks prior to the anticipated testing date so the customer can make travel arrangements.
- Leak Detection will utilize a Fluke ii900 Sonic Industrial Imager

OPERATION & MAINTENANCE MANUALS

- Quantity: (1) electronic copy
- After shipment, the Gas Conditioning System will be provided with a specifically prepared Operation & Maintenance Manual. The information provided includes a system overview, operator interface, start-up/shut down procedures, communications, alarms procedures, maintenance overview, mechanical component spec sheets and electrical component spec sheets.

MAINTENANCE

- Hydrogen Sulfide Removal System
    - Clean Hydrogen Sulfide Inlet Moisture/Particulate Filter
    - Replace Foam Pad
    - Replace Hydrogen Sulfide Media (4.6’ of media bed depth)
    - Estimated Media Cost =$4,100.00*
    - Approximate days to media exhaustion: 2,000 Days @ 50ppmv of H_2S, 25scfm
    - *Media life assumes 100% Saturated at a minimum of 90°F, with no free moisture*

**Labor for change out, disposal and shipping of media not included*

DELIVERY SCHEDULE

- Submittals delivered **3** to **4** weeks after order acceptance
- Equipment delivery is subject to confirmation at the time of order placement and/or submittal approval

PRICING SUMMARY

- Price includes all labor and expenses associated with the fabrication of the system.
- Prices do not reflect any taxes that may be applicable and are valid for 30 days.
- Price is FCA; Factory, Dubuque, IA 52002, per Incoterms 2010. Shipping costs not included, see estimate below
- Price does not include Start-up and Commissioning.
- Prices are in US Dollars
- Media Escalation: Media pricing is directly influenced by US imposed tariffs. Unison may adjust pricing for the media provided should there be future tariffs assigned to this product.
- Due to the recent & ongoing volatility in market conditions, the proposal is subject to adjustment by Unison Solutions for the increase in material costs and other cost, including but not limited to, increased cost of raw materials, increased freight costs, new or increased tariffs or duties, increased labor cost and other cost increases and delays associated with those causes. Any adjustments to the Price due to these matters shall be agreed prior to order placement and borne by the buyer.

BUDGET Hydrogen Sulfide Removal System $84,900.00

Shipping **ESTIMATE** to Bremerton, WA $5,000.00

Due to the volatility of freight pricing, the cost is an estimate and is subject to change without notice. Prior to shipping equipment, the price will be re-evaluated and adjusted as needed. It does not include any special packaging or permitting that may be required and is dependent on the final equipment dimensions and weights.

PROVIDED BY OTHERS

- If the equipment is installed outdoors, insulation is recommended for all gas piping, condensate lines, Hydrogen Sulfide and Siloxane Removal Vessels; all wet gas applications should also be heat traced per the engineer's recommendation.

PRICE DOES NOT INCLUDE

- Shipping of equipment to jobsite, in equipment pricing
- Start-up and commissioning services, in equipment pricing
- Wind or seismic calculations for all equipment
- Any maintenance work after start-up
- H_2S removal media after initial fill
- Performance guarantee or service/maintenance contract
- Any gas testing or analyses
- Bonds of any kind
- Liquidated & Actual Damages are the sole financial responsibility of purchasing contractor
- Permitting for the installation of the equipment or air permits
- Freeze protection; including insulation and/or heat trace and heat trace power
- Pipe stands for field piping
- Anchor bolts
- Compliance with the American Iron & Steel Act, as Gas Conditioning equipment is exempt

ASSUMPTIONS

VESSELS & MEDIA

- Any assumption of media life that has been given is an estimate; additional gas testing will be required at the Buyer/Owner/End Users expense.
- Vessel sizes are estimates only, gas testing will be necessary to finalize all vessel sizing.
- Media Escalation: Media pricing is directly influenced by US imposed tariffs. Unison may adjust pricing for the media provided should there be future tariffs assigned to this product.

MECHANICAL

- Flare is supplied by OTHERS
- If an existing flare is being used, it is assumed this flare is in good working order, with all safety and control equipment.
- Foundations and/or maintenance pads are designed by OTHERS to properly support the equipment.

INSTALLATION CONTRACTOR RESPONSIBILITIES

- Installation responsibilities are broken out below into three categories to outline the work; these responsibilities by no means fall on any single contractor or individual. It is the responsibility of the Buyer/Owner/End User to ensure all these conditions are adhered to, as necessary. It is the responsibility of the Buyer/Owner/End User to install all equipment in compliance with local and national codes applicable to the installation site.

BUYER/OWNER/END USER RESPONSIBILITIES

- All foundations and/or maintenance pads as necessary for equipment
- Provide and seal all roof and building penetrations as necessary
- Provide all anchor bolts, temporary lift equipment, power, labor, and all other incidentals required for proper installation of the equipment shown on the drawings that will be provided by Unison Solutions, Inc.
- All rigging and setting of equipment at job site
- Proper storage of the equipment and media prior to installation
- Provide installation of Equipment/Sub-systems per the Unison Solutions Installation Guide
- Load initial charge of Hydrogen Sulfide Media into the vessel

MECHANICAL CONTRACTOR RESPONSIBILITIES

- Provide all field piping between the Equipment/Sub-systems, including but not limited to:
    - Hydrogen Sulfide Removal System
- Provide pipe supports as necessary. Piping shall be self-supporting, and not supported off the Unison supplied equipment.
- Install all field located or shipped loose devices
- Provide all Heat Trace and/or Insulation as necessary to provide proper freeze protection as defined by Unison Solutions.

WARRANTY

- Unison Solutions, Inc. will warrant all workmanship and materials in conformance with the attached Warranty Statement. Warranty is valid for **18** months from the time the equipment is ready to ship from Unison's factory or **12** months from the date of startup, whichever occurs first.

- This proposal is for product design and equipment manufacturing only and does not include any site or consultative engineering services expressed or implied.

GRIT CHAMBER REHABILITATION

West Coast Coating and Lining Systems

253-310-1186

- Raven 405 125 mils
- 2000 sq ft ~ $60,000-$75,000
- ~$30 – $37.5 / sq ft

Contacted 6/14/23

Polibrid Coatings

klaus@polibrid.com

(956) 455 – 9916

Contacted 6/14/23

HEADWORKS SCREEN REPLACEMENT

Brian Casey

From: Marty Unger <MUnger@parkson.com>
Sent: Wednesday, June 28, 2023 6:44 PM
To: Matthew Janicki
Cc: Brian Casey; Bret Kreier; Marty Unger
Subject: RE: Bremerton WWTP
Attachments: B020 - Bremerton, WA.doc; document-aqua-guard-ultraclean.pdf

Matthew,

Budget proposal enclosed.

They have two different screen widths at Bremerton with the center screen being a 4' wide channel and the 2 outside units are in a 3' wide channel.

For budget I would use $160K per unit for the 2 older screens which are 3' wide, $185K for the newer unit in the middle channel which is 4' wide. Controls, field service are not included in these prices. No spliced connections.

Prices shown above are for an in-kind replacement.

This is our older style screen. Parkson has updated the technology to an advanced way to clean the belt. This upgrade is called our Ultra Clean unit. I have attached a brochure for reference.

If you want to add UC to the new units you could add 25k to each screen.

Controls would be an additional 28k for a Parkson standard NEMA 4X panel.

Let me know if you need anything else.

Marty Unger
Regional Sales Manager

Mobile: 954-383-1757
parkson.com

From: Matthew Janicki <matthew.janicki@caseycivil.us>
Sent: Wednesday, June 28, 2023 11:19 AM
To: Marty Unger <MUnger@parkson.com>

Parkson™
Treating Water Right

Aqua Guard® UltraClean™

Self-Cleaning Moving Media Channel Screen

The Aqua Guard® UltraClean™ represents the next generation of in-channel fine screening, outperforming the original design in side-by-side capture rate tests by over 50%. This superior performance comes from a series of patent-pending improvements in the “head” of the Aqua Guard UltraClean screen, each drawn from nearly 40 years of experience with the classic Aqua Guard® platform. Designed with the operator in mind, the Aqua Guard UltraClean also offers easier access to key areas of the screen such as the brush, which has been reengineered to reduce routine maintenance by up to 75% over the original version. The Aqua Guard® UltraClean™ technology is available both on new screens, and as a new “head” retrofit for existing Aqua Guard® element screens.

Features

- UltraClean design
- Low power consumption (1.0 HP or less)
- Self-cleaning with independent brush drive (0.5 HP)
- Dual spray bars assist cleaning brush
- No submerged bearings
- All moving parts can be accessed and serviced above water level
- Coarse and fine screening in one unit
- Flows to 100 MGD in a single unit
- Delivered fully assembled
- No attachment to sides or bottom of channel

Benefits

- Improved solids capture
- Less screen and downstream plant maintenance
- Quick-release side brush removal
- UltraClean brush with independent brush drive
- Low operation costs and ease of maintenance
- High capacity
- Ease of installation

Principle of Operation

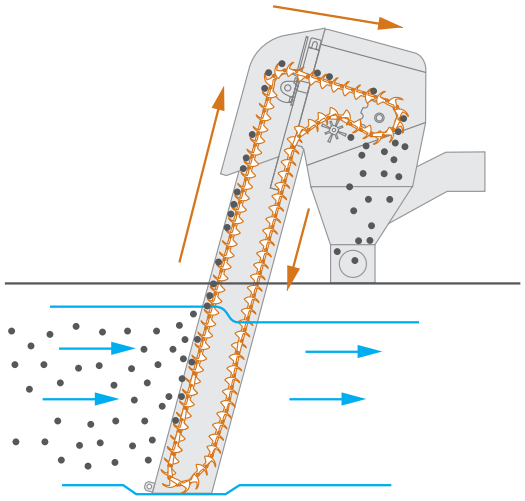
The Aqua Guard UltraClean screen, a self-cleaning in-channel screening device, utilizes a unique filter element system designed to automatically remove solids larger than element spacing. Aqua Guard screen filter elements form an underwater grid that ensures better capture rates when compared to rake bar screens that utilize only vertical bars for screening. A specific configuration of filter elements is mounted on a series of parallel shafts to form an endless moving belt that collects, conveys and discharges solids for further processing or disposal. Solids contained in a wastewater flow are captured on the filter elements and carried upward on the belt assembly to discharge at the rear of the unit. Two-stage screening is achieved, which results in improved capture rates. Coarse filtration occurs on the forward screen face and fine filtration on the recessed face. As the rake tip of one row of filter elements passes between the shank arm of the lower row, the elements automatically clean themselves. The unit is equipped with water sprays and a rotating brush that provides additional removal of solids.

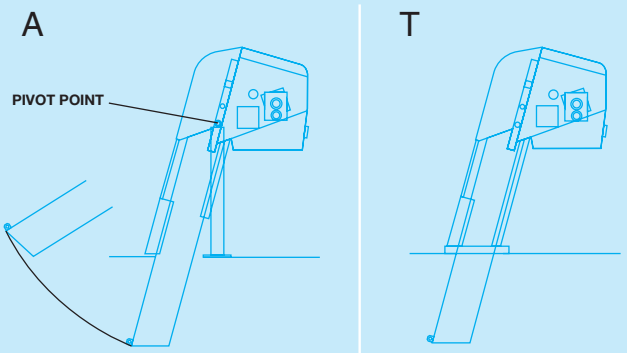
Design Parameters

Standard screen widths are 1.0' to 9.0' depending on the model with flow rates up to 100 MGD with a single unit. Two frame styles are available depending on space and channel depth requirements. Type A is a pivoting design and Type T is a stationary design. The Aqua Guard UltraClean screen can be installed at angles 60°, 75° and 85° depending on the frame and model selected. For maximum efficiency of operation, greater flow rate and higher solids removal, the recommended angle of inclination is 75°. The screen conveys solids up and out of the channel at a speed of 7ft/min. The maximum amount of debris, typically measured in cubic yards per hour, that can be removed from the stream is a function of model and angle. Movement of the screen can be continuous or intermittent; however, intermittent operation is recommended. This allows a mat of solids to build up on the filter-rake elements, which increases the solids capture rate.

Added Capacity Using Aqua Guard® UltraClean™

Design Parameters	Model MN (Standard)	Model S (Heavy Duty)
Minimum Channel Width (in.)	12	24
Maximum Screen Width (in.)	66	108
Maximum Design Headloss (in.)	10	24
Element Spacing (mm)	3-15	3-30





Parkson™
Treating Water Right

Fort Lauderdale
Chicago
Kansas City
Denver

1.888.PARKSON
technology@parkson.com
www.parkson.com

AGUC

Brian Casey

From: Marty Unger <MUnger@parkson.com>
Sent: Wednesday, July 19, 2023 7:12 PM
To: Brian Casey; Matthew Janicki; Chris McCalib
Cc: Bret Kreier; Marty Unger
Subject: RE: Bremerton WWTP

Brian,

We would need to do some engineering work to see if this would fit inside their building.

Do you have as built AutoCad drawings on the site?

A budget price for a sluice trough would be in the 40-60k range (best guess without a layout).

The Parkson compactor (AWP) would be in the 80-90k range.

Both prices DO NOT include removal of existing conveyor and installation of new equipment.

Marty Unger
Regional Sales Manager

Mobile: 954-383-1757
parkson.com

From: Brian Casey <brian.casey@caseycivil.us>
Sent: Wednesday, July 19, 2023 2:37 PM
To: Marty Unger <MUnger@parkson.com>; Matthew Janicki <matthew.janicki@caseycivil.us>; Chris McCalib <chris@tec-nw.com>
Cc: Bret Kreier <bretkreier@jbiwater.com>; Marty Unger <MUnger@parkson.com>
Subject: RE: Bremerton WWTP

Hi Marty,

Were you going to offer a budgetary estimate for a screenings conveyor/compactor system from Parkson, or did I misunderstand?

Thank you,

Brian Casey

From: Marty Unger <MUnger@parkson.com>
Sent: Wednesday, August 2, 2023 3:59 AM
To: Brian Casey; Chris McCalib
Cc: Bret Kreier; Marty Unger
Subject: RE: Bremerton WWTP

Brian,

Yes, we sell a bagging system. Price is around 2k and the replacement bagging cassette is around $150.

Marty Unger
Regional Sales Manager

Mobile: 954-383-1757
parkson.com

ODOR CONTROL STACK REINSTALLATION

Project Name: Bremerton Headworks	Date: August 31, 2021
Local Representative: Vic Pedroni	Location: WA
Specification Section: NA	Equipment: FRP Stacks

Bremerton FRP Headwork Stacks

Scope :

- One (1) 40' tall Exhaust stack, 48" diameter – free standing
  - Engineered and reinforced composite base flange
  - Stainless steel support strapping
  - Hilti Anchor Bolts
  - Drain port and bottom access manway

- FRP exhaust ductwork from vertical fan outlets to stack
  - Stainless Steel Vertical support for horizontal duct leading to the stack
  - Stainless steel vertical support frame for manifold located on the fan outlet(s)
  - Flanged flexible connectors for the fan outlet(s)
  - Rectangular back-draft dampers, one for each fan outlet
  - Manifold bringing duct on fan outlet(s) together then duct leading to a breach in the stack.

Price for the above equipment, including freight to the jobsite, is $ 137,255.00
Price is budgetary in nature, subject to change without notice.

Additional items or services included:

- Design calculations, fabrication drawings, submittals and O&M manuals
- Warranty
- On-Site Start-up and On-Line training

Items **NOT** included in the ECS scope of supply:

- Offloading, storage or installation
- Anchor bolts
- Ductwork supports or hangers